"Preparing" for Success with Cast Partials

Gary Wakelam, RDT, CDT

Proper tooth preparation is a must for a successful cast partial restoration. In general, it is imperative that the clinician ensures there is adequate preparation for rests, guide planes and interocclusal space (e.g., minimum 1 mm space for clasp clearance where frame crosses dentition) as indicated by the design. Guide planes must be parallel and surfaces smooth to ensure easy insertion.

The key to the entire concept is function. Unless the remaining teeth are prepared in a fashion so that forces are applied along the long axis of the tooth and function is passive, the prosthesis will be unstable, lack proper retention or both. Guide planes, in conjunction with a prepared rest, play an important role in stabilizing the abutment tooth along the long axis during function. This insures that the forces on the abutment tooth are kind and gentle. Properly designed guide planes also eliminate potential food traps, create proper reciprocation inside the arch and help avoid buccal clasping.

The optimal solution depends on the individual case situation of course but there are certain universal concepts that can be applied depending on whether the planned design is tooth borne or has a posterior distal free-end saddle.

A. For Tooth Borne Designs

1. Place the occlusal rests on the tooth surface of the anterior and posterior abutments adjacent to the saddle area, using an oval or football shaped diamond. Rest preparations should be spoon shaped.
2. Prepare a guide plane gingival to the occlusal rest on the proximal surface by flattening the proximal wall. (Figure 1)

B. Posterior Distal Free-End Saddle

1. Prepare a spoon shaped occlusal rest in the mesial fossa of the abutment tooth. This preparation should be "lingualized" (i.e., remove the lingual portion of the mesial marginal ridge adjacent to the prepared rest) so the minor connector will not contact the tooth immediately anterior to the abutment where the appliance is seated. (Figure 2)
2. Prepare a guide plane on the mesial surface that connects with the prepared rest (Figure 3). The buccal extension of the guide plane should stop at the buccal extension of the occlusal rest. The mesial guide plane is prepared without breaking contact with the adjacent teeth. Buccal-lingual 1/3 contact is maintained.
3. On the distal surface, just over the marginal ridge, prepare a guide plane by slightly flattening the distal proximal surface. (Figures 3, 4 and 5)
4. If resiliency is desired, it can be accomplished by eliminating the distal occlusal rest. The mesial rest remains.

PREPARATION TIPS

General

- No rest, guide plane or interproximal preparation should penetrate through the enamel into the dentin (any preparations which would penetrate the enamel indicates that crowns to house the rest or guide plane should be placed on abutment teeth).
- Retention of the casting on the tooth is dependent on two factors: parallelism of the preparation and the surface area of the casting in contact with tooth structure. (Figure 6)
- Many short teeth do not have the potential for an area of large contact and must be prepared with minimum occlusal convergence.
- An extension of the clasp onto the facial aspect and/or an I-bar will be necessary for proper reciprocation and function if an interproximal guide plane is not properly created when supporting a free-end edentulous side.
- A contained undercut can be created to eliminate a buccal I-bar when an undercut is not present on the area of the tooth where the clasp is placed facing the edentulous side.

Rest Preparation

- When preparing the teeth, visualize the cast partial framework in place, making provision for the rests. (Figure 7)
- Rest preparations should allow a rest thickness of 1.5 mm.
- The proximal occlusal line angle of the rest should be rounded, not a sharp right angle.
- If the retainer is an inlay, the proximal box should be wide enough to allow adequate width to the rest seat.
- On bicuspids, the rests should encompass 1/3 the mesiodistal width of the tooth and at least 2/3 of the buccolingual width.
- Mesial lock-in rests should be incorporated to eliminate dislodging during function on a bilateral – distal extension involving anterior teeth.

Anterior Lingual Rest Preparation

- The support of anterior teeth can be required to resist occlusal stresses and provide indirect retention.
- Rests on incisors can be prepared over the cingulum or on the incisal edge of the tooth (incisal, inward bevel or lock-in rest depending on tooth position and contour). The cingulum rest should be at least 1 mm deep and one-half the width of the tooth. If employed, the incisal rest should be at least 1.5 mm deep and 1.5 mm wide. (Figures 8A, B and C)
- Crowned teeth offer the best opportunity to control contours and provide best configuration for integration with removable cast partial.
- When a partial or complete veneer crown is placed on an anterior tooth, an adequate cingulum rest seat can be planned and incisal rests eliminated (incisal resting provides less favourable force vector and is much less esthetic).

The key to the entire concept is function.

- Cingulum rest should be placed within normal tooth contours and provide positive support (as opposed to a deflective slope).

Guide Plane Preparation

- Some partial denture designs require that guide planes be established on the lingual or proximal surfaces of the abutment teeth, or that the entire lingual surfaces be blanketed.
- Mentally position the partial denture so that space exists for the minor connector (failure to do so may result in overcontouring or impinging on the tongue space).

Crowning Abutment Teeth

- Reasons for restoring abutment teeth with crowns include:
  - * Extensive caries.
  - * Large or unserviceable restora tions that should be replaced before the tooth is subjected to resting and clasping stresses.
  - * Lack of a naturally occurring undercut in any area of the tooth to provide clasp retention.
  - * Anterior teeth designated for cingulum rests.
- If possible, the line of draw of the abutment crown should be different from the path of placement of the removable cast partial (i.e., the stresses placed on the abutment crown when the partial denture is removed will not act to unseat the crown).

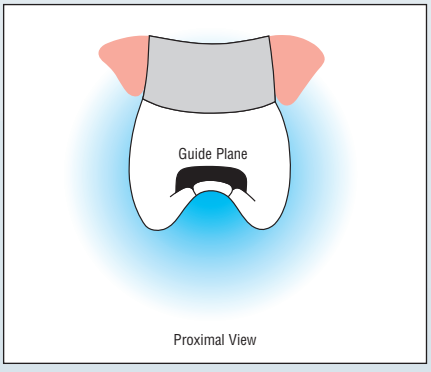

Figure 1

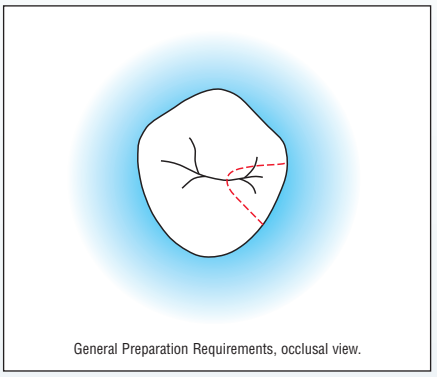
General Preparation Requirements, occlusal view.

Figure 2

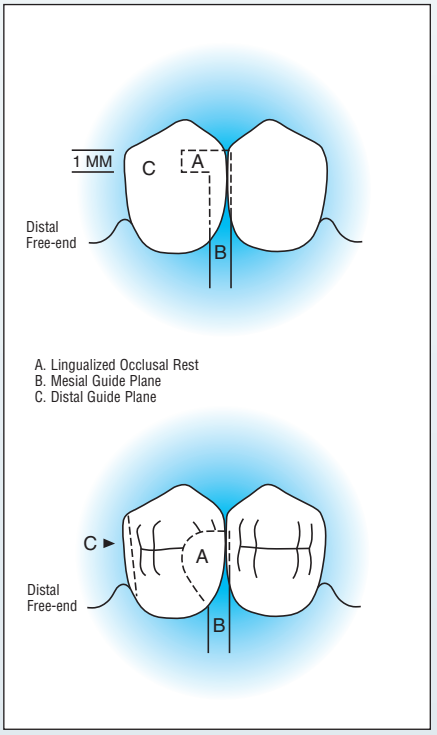

Figure 3

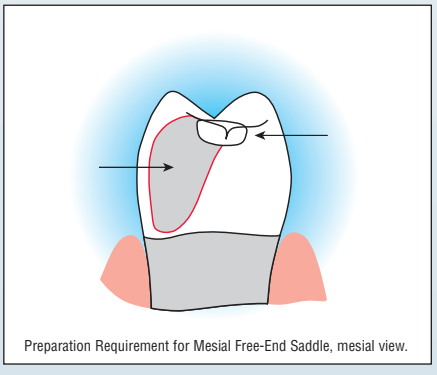
Preparation Requirement for Mesial Free-End Saddle, mesial view.

Figure 4

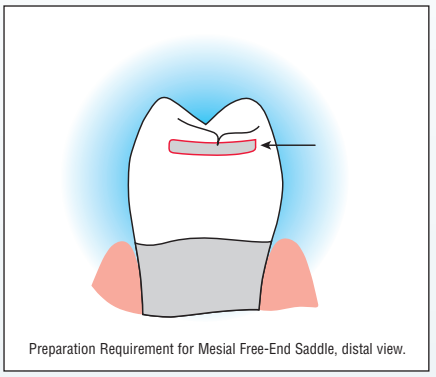
Preparation Requirement for Mesial Free-End Saddle, distal view.

Figure 5

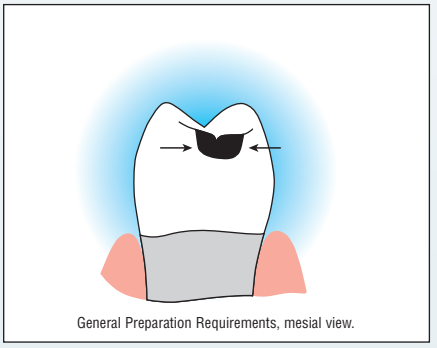
General Preparation Requirements, mesial view.

Figure 6

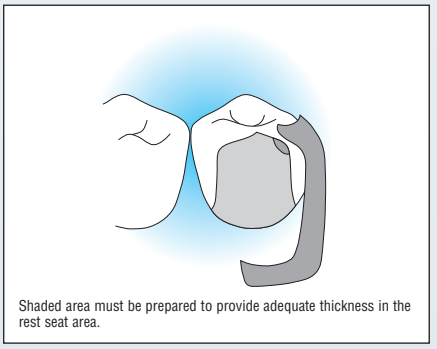
Shaded area must be prepared to provide adequate thickness in the rest seat area.

Figure 7

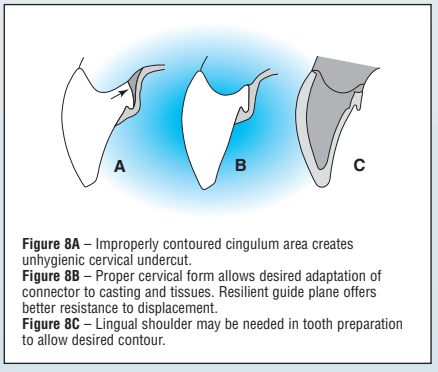

Figure 8A – Improperly contoured cingulum area creates unhygienic cervical undercut.
Figure 8B – Proper cervical form allows desired adaptation of connector to casting and tissues. Resilient guide plane offers better resistance to displacement.
Figure 8C – Lingual shoulder may be needed in tooth preparation to allow desired contour.

Figure 8